DOCUMENT RESUME

ED 265 962 PS 015 627

AUTHOR Hess, Robert D.; And Others
TITLE Cultural Variations in Family Beliefs about Children's Performance in Mathematics: Comparisons among the People's Republic of China, Chinese-American, and Caucasian-American Families.
SPONS AGENCY National Science Foundation, Washington, D.C.; Spencer Foundation, Chicago, Ill.
PUB DATE 86
GRANT NSF-BNS-91-07542
NOTE 46p.
PUB TYPE Reports - Research/Technical (143)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Chinese Americans; Cross Cultural Studies; *Cultural Differences; Elementary Education; *Elementary School Students; Foreign Countries; *Grade 6; *Mathematics Achievement; Mother Attitudes; Mothers; *Motivation; Performance Factors; Whites
IDENTIFIERS *China

ABSTRACT

This study examined family beliefs and motivation as sources for the superior performance on mathematics tests by Chinese students compared with Caucasian students in the United States. Beliefs about children's performance were examined in mothers and their sixth grade children in the People's Republic of China and in Chinese-American and Caucasian-American groups in the San Francisco Bay area. Interviews covered attributions for children's relatively high and relatively low performance in mathematics, using five options: ability, effort, training at home, training at school, and luck. Mothers were asked how they would respond to specific instances of unusually high or low performance in math. ANOVAS were run on cultural/national status, generation (i.e., mothers and children), and gender of child. Results indicated that mothers in the People's Republic of China attributed relative success to the school and low performance to lack of effort, in contrast to Caucasian mothers who blamed lack of ability and the school for low achievement. Responses of Chinese-American mothers were usually closer to those of mothers from the People's Republic of China than to Caucasian parents. (Author/DST)

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# Cultural Variations in Family Beliefs About Children's Performance in Mathematics: Comparisons Among The People's Republic of China, Chinese-American, and Caucasian-American Families

Robert D. Hess

Chang Chih-Mei

Stanford University

Teresa McDevitt

University of Northern Colorado

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Running head: CULTURAL VARIATIONS IN FAMILY BELIEFS

ABSTRACT

This study examined family beliefs and motivation as sources of the superior performance on tests of mathematics shown by students of Chinese background compared with Caucasian students in the U.S. Beliefs about children's performance were examined in mothers and their sixth grade children in the People's Republic of China and in Chinese-American and Caucasian-American groups in the San Francisco Bay area. Interviews covered attributions for children's relatively high and relatively low performance in mathematics, using five options: ability, effort, training at home, training at school, and luck. Mothers were also asked how they would respond to specific instances of unusually high or low performance in math. ANOVAS were run on cultural/national status, generation (i.e., mothers and children) and gender of child. Mothers in the PRC attributed relative success to the school and low performance to lack of effort, in contrast to Caucasian mothers who blamed lack of ability and the school for low achievement. Responses of Chinese-American mothers were usually closer to those of mothers from the PRC than to Caucasian parents. Mothers from the PRC would offer partial reinforcement to children who brought home a good grade; American mothers, both Chinese and Caucasian, were much more likely to offer unqualified praise and encouragement.

# Cultural Variations in Family Beliefs About Children's Performance in Mathematics: Comparisons Among The People's Republic of China, Chinese-American, and Caucasian-American Families

Students from the United States perform less well on tests of mathematics and science than do students from Asian countries, particularly Japan and China (Husen, 1967; Second Study of Mathematics Summary Report, 1985; Stanley, Huang, & Zu, in press; Stigler, Lee, Lucker, & Stevenson, 1982; Wong, 1980). Although reports of such national differences have been available for almost twenty years, our knowledge about the factors responsible for these discrepancies is still incomplete. National differences have been attributed to such divergences in national educational systems as the time students spend in school (Kirst, 1981; Stigler et al. 1982), time on task while in the classroom (Stigler et al. 1982), and the comprehensiveness of the mathematics curriculum (Stigler et al., 1982). However, the evidence appears to be equally strong that Asian students within the U.S. perform at higher levels than Caucasian students on tests of academic achievement and other measures of educational attainment (California State Department of Education Assessment Program, 1981; College Board, 1982; Vernon, 1982), suggesting that national differences are not solely due to institutional factors and may also reflect culturally transmitted values, beliefs, and behaviors.

In this paper we examine such cultural differences in

motivational aspects of school achievement, using data on beliefs of family members about children's performance in mathematics. The family members participating in the study were mothers and children from three cultural groups: Chinese families from the People's Republic of China and Chinese-American and Caucasian-American families.

## Cultural Differences in Motivation as Sources of Variations in Educational Achievement

The value the Chinese place on scholarly endeavor and arduous toil is documented by historical accounts and cultural folklore. Academic accomplishments have long been respected in Chinese culture, and with some brief interruptions this regard has persisted to the present day (Wan, 1985; Xiangrong, 1985). Intellectual facility is appreciated in its own right, but it also is valued as a path to employment and status. In China, the examination system has been a route to social, political, and economic mobility for more than a thousand years (Ridley, 1973). This respect for scholarly attainment is matched by a high regard for effort: hard work is seen as the route to accomplishment and competence (Chang, 1985). Historical accounts of preparation for examinations reveal exceedingly high levels of motivation (Ridley, 1973). The ancient teachers and scholars urged on young students by saying, "If you are not diligent in study when your hair is black, it will be too late to sigh about study when your hair is white." In modern times, parents, teachers, and adults refer to folklore containing vivid exemplars of the value of effort. Among many legends well known to the Chinese, three can

be used to illustrate this respect for effort: Kuang Heng, a boy in a poor family that could not afford fuel for lights at night bored a small hole through a wall, which his home had in common with a more affluent neighbor's house, to find light by which to study; Che Yin, who made light for his studies by carrying fireflies; and Sun Kang, who studied by the light of the moon reflected off the snow (Huang, 1969). These and other similar legends which extol the virtue of effort in pursuit of learning are familiar throughout China.

Beliefs about the efficacy of effort also appear in writings about educational practice. A volume describing educational principles (Huang, 1969), taken from Confucius and other revered scholars, includes several injunctions and approbations about effort. These statements, quoted in Huang (1969), offer advice on several aspects of scholarly activity: 1) the role of mental concentration (e.g., "Study as if you could not attain your aim and were afraid you should lose it," (Confucius, Tai Bo chapter)); 2) the primacy of effort (e.g., "Talent and will come first in study; will is the teacher of study and talent is the follower of study. If a person has no talent, it <achievement> is possible. But if he has no will, it is not worth talking about study." (Xu Gan, Zhong Lun)); 3) the need for persistence (e.g., "Being diligent in study means devoting one's effort to it for a long time." (Confucius, Zi Zhang chapter)); and 4) the efficacy of effort (e.g., "One will inevitably succeed in one's study if one is diligent and takes delight in study." (Confucius, Xu Er chapter)).

Considerable evidence indicates that scholarly values were

part of China well before the 19th-century immigration of Chinese to California. It is thus reasonable to assume that early immigrants brought with them the cultural view that scholarship and effort are the routes to social and economic mobility. The upward mobility of Chinese in the United States is consistent with the assumption that such values were present and effective in families of early migrants (Sucheng, 1981; Vernon, 1982). Given the cohesion of the Chinese family system, we would expect these values to be preserved over several generations, although they might decline somewhat over time.

Achievement and individual effort have also been themes in the cultural and economic development of the United States. However, it appears that the value placed on achievement and hard work has declined in the United States in the past half century (Spence, 1985). For example, observational studies indicate that the discrepancy between time spent on work and reported time actually at work increased between 1965 and 1975 (Stafford and Duncan, 1979, cited in Yankelovich & Immerwahr, 1983); according to observations by Cherrington (1980), only about half of workers' time was spent in actual job-related activities. About half of the workers surveyed by Yankelovich and Immerwahr (1983) said that they put in no more effort than was required. Also, the heroes of American culture, although praised for individualism, strength of character, and accomplishment, include few in which effort and scholarly achievement are closely linked. Thus, despite a traditional regard for achievement and success in American culture, effort seems to be less salient and less oriented toward

scholarly achievement in the United States than in Chinese culture. We expected, then, that the families from the PRC would attribute children's performance in mathematics to effort and individual responsibility more than would either group from the United States. We also expected that, within the U.S., the Chinese-American families would emphasize these qualities more than the Caucasian-American families.

Overview of the Study

The logic of this study assumes that family beliefs about achievement are linked to parents' behavior and to children's performance. There is a considerable body of research and theory to support this view. For example, studies of family characteristics and academic attainment show parents' attitudes toward achievement to be related to children's performance in western cultures (Dave, 1965; Hess & Holloway, 1985; Marjoribanks, 1980) and in China (Huang & Wen, 1984). Presumably, these associations occur because parents' beliefs about the importance of children's achievement and the factors responsible for fluctuations in this performance influence parents' actual responses to their children. In support of this interpretation, conceptions of the malleability of the child's character have been observed to affect parents' responses to specific acts (Sameroff, 1979). Furthermore, parents' attributions and perceptions of the extent to which children are willful, causal agents in regulating their behavior may determine how parents respond to children's actions, especially actions construed negatively (Dix & Grusec, 1984). In addition, parents' beliefs may influence children's performance through their

effects on children's beliefs. For example, convinced by their parents of the value of hard work, children may come to persist in the face of difficulty. Although little evidence exists about transmission of beliefs that are specific to academic achievement, it is reasonable to assume that parents who hold strong feelings about achievement effectively make these beliefs evident to their children in a variety of ways. One of the ways that parents may influence children's achievement, of course, is by promoting the value of effort. A line of work by Weiner and his colleagues (Weiner, 1980) has demonstrated the efficacy of attributions to lack of effort for unsuccessful performance. By attributing relative failure to lack of effort, individuals may expect that they can do better on subsequent tasks by working harder; with these beliefs, they may tend to persist until they have overcome obstacles.

This study was designed to examine both national and cultural differences in family beliefs about the role of effort and other sources in children's performance in school. The national comparisons are based on the contrasts between families from the PRC and those from the United States. If distinctions are found between the PRC families and families in the U.S., this would argue for national differences in motivation. These might come from both institutional policies and cultural beliefs and practices.

Cultural comparisons are based on contrasts between Caucasian-American families and both the PRC and Chinese-American groups. Divergences between the Caucasian-American families and

American-Chinese and PRC families argue for cultural distinctions. A difference between Caucasian-American and Chinese-American groups would be particularly important, since the students from these families participate in the same political and educational systems, ruling out the effect of institutional differences.

The data gathered in the interviews included causal explanations by mothers and children for why the children did as well as they did and why they did not do better. In this comparison of the beliefs of families from the PRC, Chinese-American families, and Caucasian families, we expected that Chinese in the PRC would emphasize effort, especially its absence as a cause of relatively low performance, more than either of the other two groups. We also expected that traditional values about scholarship and achievement would persist to some degree in the Chinese-American families; the Caucasian mothers and children would place less emphasis on effort and individual responsibility than the other two groups. Our analyses are based on the entire set of attributions presented to the families; it is easier to propose cultural differences in the effort attribution than in the other attributions, but we include the entire set in multivariate analyses so as to obtain a more complete understanding of the patterns of attributions held by the three groups.

As a supplement to our analysis of cultural differences in attributions, we obtained reports from mothers about the responses they would give to instances of children's relatively low and relatively high performance. Although we did not have specific hypotheses about the types of responses on which the groups would differ, we expected that the families from the

People's Republic of China would treat low performance especially seriously. If, as we propose, the Chinese parents believe that their children's failure to achieve at higher levels is due to an internal factor over which the children have control (i.e., effort), they may show anger and criticism at children's low performance (Dix & Grusec, 1984). Such feelings are more likely to spur parental intervention than are feelings of resignation or pity, which may spring from a belief that failure was caused by an external source (the school) or an internal unchangeable source (natural ability) that are beyond the child's control. A combination of explanations that focus on internal factors and controllability offers a particularly powerful basis for parental response and initiative.

Consequently, we can expect the tremendous value placed on scholastic achievement and hard work by the Chinese to be manifested in a range of behaviors designed to attain these ends. Such behavior might include tutorial assistance, motivational strategies to ensure that children spare no effort in working toward academic goals, and close supervision of children's scholastic progress. It might also include the expression of anger and relatively severe reprimands and warnings in response to poor performance.

## Method

### Subjects

This study draws from three cultural groups: families from the Peoples' Republic of China, and Chinese-American and Caucasian-American families. The original Caucasian sample

consisted of 67 native-born American mothers from a range of socioeconomic backgrounds, and their first-born 4-year-old children. These families were recruited through preschools and daycare centers in the San Francisco Bay Area. The median education of parents was about two years of college. When the children were in sixth grade, a follow-up study was conducted. At this time we were able to locate and contact 48 families from the original sample; 47 agreed to participate. Of these, 23 had girls; 24 had boys. Only data from the follow-up phase are reported in this paper.

Fifty-one Chinese-American mothers from a range of socioeconomic backgrounds and their sixth-grade children were recruited in the San Francisco Bay Area, mainly through schools. Families were considered to be Chinese if they had ancestral origins in The People's Republic of China, Taiwan, or Hong Kong and both parents were Chinese. For most of the families (38), the children were third-generation Chinese: their grandparents were born in a Chinese country with their parents born in the United States. For the remaining families (13), the children were second-generation Chinese: their parents were born in China but had moved to the United States at least 15 years prior to the interview. The median education of parents was 3.8 years of college. There were 28 girls and 23 boys in the group. The sample was not constrained to include only first-born children.

The research group from the People's Republic of China consisted of 47 native-born mothers from a range of socioeconomic backgrounds. Their children were in sixth grade (or equivalent); all had taken the entrance examination to middle school. They

were recruited in Beijing primarily through the schools. The median education of parents was 12 years. There were 21 boys and 26 girls in the research group.

Materials and Procedures

The instruments and procedures were as follows. In both the U.S. and the PRC, we interviewed mothers and children separately for their causal attributions. With minor modifications, mothers and children were asked the same questions about the children's performance.

The maternal interview was conducted as follows. First, we asked mothers to judge how well the child had performed in mathematics during the sixth grade. The mother was asked to indicate the child's level of performance on a 6-point scale, ranging from "not doing as well as most" to "doing the very best in the class." Then, for the relative success condition, the interviewer noted the ranking the mother gave and asked why the child did that well. For example, the interviewer might have said, "You have indicated that your child is doing better than many in the class. Why do you think she is doing that well?" The mother was then shown five cards, each labeled with an attributional phrase. The following attributional phrases were used:

My child has natural ability for math.

My child tries hard in math.

My child has had good training at school in math.

My child has had good training at home in math.

My child has been lucky in math.

We then asked the mothers to distribute 10 plastic token chips across the five cards to weight the importance of each as a reason for why the child did as well as he or she did. This procedure resulted in five attribution variables, each with possible ranges of 0 to 10. These specific attributions were selected on the basis of previous research (Holloway & Hess, 1982).

An analogous procedure was used for questions about relatively low performance. In this condition, the question was "You have indicated that your child wasn't at the (very) top of the class. Why do you think he/she isn't doing (even) better in math?" (If the mother reported that the child was at the top of the class, the interviewer suggested that the child might not be the best in the school district or community and asked why the child was not doing even better.) The purpose of these questions was to examine the factors mothers believed limited the children's performance. The attributional phrases were worded to reflect low performance (e.g., "My child does not try hard in math.")

The mothers were also asked about what they would say to their child if she/he brought home an unusually good (and unusually bad) grade in mathematics. These questions were part of the interview in the PRC. In the U.S., they were asked as a telephone follow-up to the original interview. Forty-one out of the original 51 Chinese-American mothers could be later located and contacted; these mothers responded to the questions. The Caucasian-American families had been interviewed three years earlier and only a small part ($n$= 18) of the Caucasian-American group could be reached for the follow-up questions.

The child interview was identical to the mother interview except for minor changes to make the questions relevant to the child's own performance. Questions about mothers' response to the child's performance were omitted except for the PRC children.

For the interview in the PRC, the technique of back-translation was used to ensure similarity of questions in the two countries.

## Results

To analyze our data we employed multivariate analyses of variance. Child gender and cultural group were included as between-subjects factors. Generation of informant (i.e., mother, child) and attribution (i.e., ability, effort, home training, school training, and luck) were within-subject factors. Analyses were computed separately on explanations for why the children did as well as they did and why they did not do better. The mean weights assigned to the attributions for these various subgroups (by cultural group, generation, and child gender) are represented in Tables 1-4. To facilitate comparison of the three cultural groups, the groups were combined across child gender and the means of attributions offered by mothers and children are graphed in Figures 1-4.

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Insert Tables 1-4 and Figures 1-4 about here

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### Why Children Did as Well as They Did

For explanations as to why children did as well as they did, the entire group of participants viewed individual attributions

as exerting dissimilar amounts of influence [$F(4,136) = 648.50$, $p < .001$]. For the entire group, school training was seen as especially important followed by effort, home training, and ability. Luck was seen as having negligible influence. This pattern is qualified by several higher-order interactions.

The three cultural groups used different patterns of attributions, as shown by a significant interaction between cultural group and attribution when mothers and children are considered together [$F(8,272) = 9.79$, $p < .001$] (see Figures 1 and 2). A series of one-way univariate ANOVAS were computed on the individual attributions to examine on which attributions the cultural groups differed. Scheffe contrasts at the .05 level were computed when the $F$ values were significant. The cultural groups did not differ on ability or effort, but they did assign different weights to school training [$F(2,142) = 29.57$, $p < .001$], home training [$F(2,142) = 17.40$, $p < .001$], and luck [$F(2,142) = 4.94$, $p < .01$]. Scheffe contrasts indicated that the PRC Chinese saw school training as more influential than did either the Chinese-Americans or the Caucasian-Americans. The Caucasian-Americans viewed school training as having greater responsibility than did the Chinese-Americans. The Chinese-Americans viewed home training as exerting greater influence than did the PRC Chinese or the Caucasian-Americans, and the Caucasians viewed it as being more important than did the PRC Chinese. The significant effect on luck appeared to be due to the tendency of the Caucasian-Americans to assign greater weight to it than did the PRC Chinese.

The patterns of attributions also differed between boys and girls, as indicated by a significant interaction between gender of child and attribution [$F(4,136) = 2.92$, $p < .05$]. Both the interactions between sample and attribution and between gender of child and attribution were qualified by a higher-order interaction between attribution and sample and gender of child [$F(8,272) = 2.44$, $p < .05$]. This higher-order interaction indicates that the differences in patterns of attributions between the cultural groups were not constant across the two sexes. Likewise, gender difference in patterns of attributions were not constant across the three cultural groups. We were particularly interested in gender differences within the three cultural groups and so computed a series of $t$-tests between boys and girls within each of the three cultural groups. There was one significant gender difference for the PRC sample, that for effort ($t(45) = 3.05$, $p < .01$). Girls and their mothers in the PRC assigned more weight to effort than did boys and their mothers. There were no significant gender differences in the Chinese-American sample. For the Caucasian-Americans, boys and their mothers viewed ability as a stronger contributing factor than did girls and their mothers ($t(45) = 2.84$, $p < .01$), while the girls and their mothers viewed school training ($t(45) = 2.46$, $p < .05$) and luck ($t(45) = 2.14$, $p < .05$) as more important than boys and their mothers.

The patterns of attributions also differed for mothers and children [$F(4,136 = 10.59$, $p < .001$], but this was qualified by an interaction between sample and informant and attribution [$F(8,272) = 1.98$, $p < .05$]. We computed additional multivariate

analyses of variance to see if the three cultural groups differed when mothers and children were taken separately. The patterns of attributions differed across the cultural groups for both mothers [$F(8,278) = 8.52$, $p < .000$] and children [$F(8,278) = 3.86$, $p < .001$]. Although there were differences among the three cultural groups for both mothers and children in the patterns of attributions offered, it is possible that the manner in which the patterns were dissimilar across the cultural groups differed for mothers and children. In other words, the three groups of mothers may have distinguished themselves on a different set of attributions or on the same set of attributions but in a different direction than did the three groups of children. To examine this possibility, we computed a series of univariate analyses of variance on the attributions, separately for mothers and children, and when significant, followed them up with Scheffe tests. Cultural differences were similar for mothers and children. When the mothers were examined separately, the three cultural groups did not differ on ability, effort, or luck, but they did differ on school training [$F(2,142) = 28.77$, $p < .001$]. This effect appeared due to the PRC Chinese mothers' greater use of school training than that by the Chinese-American and the Caucasian-American mothers. The groups also differed on home training [$F(2,142) = 17.03$, $p < .001$]. The Chinese-Americans saw home training as being more important than did either the PRC Chinese or the Caucasian-Americans. When the children were examined separately, the three cultural groups did not differ on ability or effort, but they did differ on school training

[$F(2,142) = 9.28$, $p < .001$], home training [$F(2,142) = 4.42$, $p < .05$], and luck [ $F(2,142) = 4.05$, $p < .05$]. The PRC Chinese children assigned greater weight to school training than did the Chinese-Americans, while the Chinese-Americans saw home training as being more important than did the PRC Chinese. The Caucasian-Americans attributed their relative successes to luck more often than did the PRC Chinese.

Finally, the remaining interactions between attribution by sample by gender by informant and between attribution by gender by informant were not significant.

Why Children Did Not Do Better

For explanations as to why the children did not do better, participants also viewed individual attributions as exerting dissimilar amounts of influence [$F(4,136) = 108.13$, $p < .001$]. For the entire group, effort was seen as the single most important reason for not doing better. This was followed by lack of ability, poor home training, and poor school training. Again, luck was seen as having negligible influence. This pattern is qualified by several higher-order interactions.

The three cultural groups used different patterns of attributions, as is shown by a significant interaction between cultural group and attribution when mothers and children are considered together [$F(8,272) = 10.88$, $p < .001$] (see Figures 3 and 4). A series of one-way ANOVAS were computed to determine the specific attributions on which the cultural groups differed, and Scheffe contrasts at the .05 level were computed when the $F$ values were significant. The cultural groups did not differ on poor home training, but they did differ on lack of ability [$F(2,142) = 8.97$,

$p < .001$], lack of effort [$F2,142) = 39.25$, $p < .001$], poor school training [$F(2,142) = 6.78$, $p < .01$], and bad luck [$F(2,142) = 20.05$, $p < .001$]. Scheffe contrasts indicated that the Caucasian-Americans saw lack of ability as a more important reason than did the PRC Chinese. The PRC Chinese viewed lack of effort as more influential than did either the Chinese-Americans or the Caucasian-Americans. The Caucasian-Americans assigned greater weight to poor school training than did the PRC Chinese. Finally, both the Caucasian-Americans and the Chinese-Americans viewed bad luck as a stronger determinant than did the PRC Chinese.

The patterns of attributions also differed for mothers and children [$F(4,136) = 9.44$, $p < .001$], but this was qualified by an interaction between sample and informant and attribution [$F(8,272) = 2.32$, $p < .05$]. We computed additional multivariate analyses of variance to see if the three cultural groups differed when mothers and children were taken separately. The patterns of attributions differed across cultural groups for both mothers [$F(8,278) = 4.27$, $p < .001$] and children [$F(8,278) = 8.36$, $p < .001$). To see on which attributions the cultural groups differed when mothers and children were taken separately, we computed a series of univariate analyses of variance on the attributions, and when significant, followed them up with Scheffe tests. When the mothers alone were examined, the cultural groups differed on lack of ability [$F(2,142) = 3.77$, $p < .05$], lack of effort [$F(2,142) = 14.96$, $p < .001$], and poor school training [$F(2,142) = 5.66$, $p < .01$], but not on poor home training or bad luck. The Caucasian-American mothers viewed lack of ability and poor school

training as more important than did the PRC Chinese mothers. The PRC Chinese mothers, in contrast, placed greater weight on lack of effort than did either the Caucasian-Americans or Chinese-Americans. When the children alone were examined, the cultural groups differed on lack of ability [$F(2,142) = 6.51$, $p < .01$], lack of effort [$F(2,142) = 26.48$, $p < .001$], and bad luck [$F(2,142) = 15.41$, $p < .001$]. The Caucasian-American children viewed lack of ability as being more responsible than did the PRC Chinese children. The PRC children viewed lack of effort as more important than did the Chinese-American or the Caucasian-American children; the Chinese-Americans viewed lack of effort as more important than did the Caucasian-Americans. The Caucasian-Americans and the Chinese-Americans assigned greater weight to bad luck than did the PRC Chinese.

Finally, the patterns of attributions did not differ for boys and girls, and the remaining interactions were not significant: sample by gender by attribution, gender by informant by attribution, sample by gender by informant by attribution.

Maternal Responses to Specific Instances of Children's Good and Poor Performance

In addition to asking mothers questions about why their children might perform at a level higher or lower than usual, we asked mothers what they might say to their children if such events actually transpired--that is, if the children really did bring home a mark that was higher or lower than usual. In response to the question about what mothers would do when the children performed especially well, three categories of responses were coded. Ninety percent agreement was obtained between two

raters who coded independently. In most cases, mothers offered only one response; in cases in which they offered more than one type of response, only their first response was coded. The three categories were as follows:

1. Provides rewards, verbal or tangible, without setting higher standards (e.g., "Good job!" "I'd give him something he likes to eat.").

2. Sets higher standards, with or without praise (e.g., "You did well but maybe next time you can do even better." "You should be getting even higher grades.")

3. Other: Emphasizes value of effort or working carefully, attempts to determine reason for good performance, or provides other response (e.g., "You're studying hard, and it's paying off." "This time you checked all of your answers--that's why you did so well." "Why do you think you did so well this time?")

In response to the question about what mothers would do when the children performed poorly, four categories were coded. Eighty-one percent agreement was obtained. Again, in most cases, mothers offered only one response; in cases in which they offered more than one type of response, their first response only was coded. The four categories were as follows:

1. Punishes or threatens punishment (e.g.,"I'd show him I was angry, or I'd spank him.").

2. Determines reasons for low performance (e.g., "I'd find out exactly what she didn't understand." "I'd ask if he didn't try hard.")

3. Urges more care or effort (e.g., "You need to try

harder." "You were careless. Next time be more careful!").

4. Other: Comforts child, describes long-term consequences, ignores the information, or provides other response (e.g., "I'd tell her that it's all right, that she shouldn't get upset." "How will you get into middle-school if you do so poorly?" "I wouldn't say anything.").

Mothers of the three cultural groups appeared to use these various categories to different degrees (Table 5). The analyses indicated that the PRC Chinese and Chinese-American mothers responded in different ways for both relatively high and relatively low performance (for relatively high performance, $\underline{X}^2$ (2) = 26.28, $\underline{p} < .0001$; for relatively low performance, $\underline{X}^2$ (3) = 12.55, $\underline{p} < .01$).

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Insert Table 5 about here

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Differences between the PRC Chinese and Chinese-American mothers in responses to relatively high performance are striking: Chinese-American mothers more often reward their children than do the PRC Chinese. Examples of responses from Chinese-American mothers confirm this finding:

"I would say 'Good job,' like everybody else would say." "I would encourage her and praise her and get her something that she wants to make her happy."

Mothers from the PRC were less free with their praise. They more often reported attempting to set even higher standards. Two examples illustrate the responses of the mothers from Beijing:

"That's nothing to be proud about. With your ability, you should get 100 every time. If you don't, it is because you are careless."

"Don't get too excited." Compare yourself with other classmates; you still have a big gap!"

Responses of the Caucasian-American mothers, although not included in the tests of significance, are noteworthy in their similarity to the responses of Chinese-American mothers in their use of praise:

"I would be pleased and would tell him that I was pleased."

"I would be visibly impressed! Knowing her, I would feel that she had done exceptionally well, and I would be quite pleased with her."

The mothers of the three cultural groups differed less strongly in responses to relatively low performance. Proportionally, both the Chinese-American mothers and Caucasian-American mothers attempted to determine the reason for the failure of their children's relatively low performance more so than did the PRC Chinese mothers. These were some representative responses of the Chinese-American mothers.

"Your grade seems to be lower than usual. Is there some reason for that we should know about?"

"I will ask about the reason and check to see what she is doing everyday, putting enough time in study or waste her time in playing too much. Or, she does not understand the classwork."

The responses from the Caucasian-American mothers were similar:

"I would want to know if he were struggling with that particular concept. We would want to help him through that since he hadn't apparently gotten that in the classroom environment."

"We would want to find out why she was slipping and get her back to her previous level."

Only about a third of the PRC mothers offered this response. One mother put it in these words:

"You should find the reason why you made mistakes. You should correct your mistakes and remember this lesson."

About a fifth of the mothers from the PRC said that they would express anger or punish the child in some way. Some examples:

"I would be angry. I would criticize him." "You are the kind of person who won't try harder without being punished."

"Some people get things wrong because they think they are smart. If you want to be a success, being smart is not enough. Sometimes it is even useless."

The PRC mothers' reports of anger at their children's lack of effort are consistent with Weiner's formulations of the link between emotions and attributions. It is as if the PRC mothers believed that the child could do better if he or she tried harder; it was appropriate to place blame on the child. The level of emotion may reflect also the degree of importance that these mothers give to achievement.

In summary, the interviews suggest that mothers in the two American groups tended to reward the successes of their children and used a more diagnostic approach to educational problems. The PRC mothers tended to respond to successes by raising the

standards; to failure, they showed considerable feeling, often punishing the children or urging them to work more carefully and diligently.

## Discussion

The three cultural groups in this study used different patterns of attributions to account for both relative success and relative failure. Although all three groups viewed effort as a primary cause, the groups differed substantially in their emphasis on effort and in the extent to which sources other than effort were seen to play a role. For the PRC families, lack of effort was viewed as the predominant cause for low performance; other factors shared little responsibility. The Chinese-American group showed a similar pattern with somewhat less weight assigned to effort and more weight to lack of ability, poor school training, and poor home training. Although they viewed lack of effort and lack of ability as sources of relatively low performance, the Caucasian-Americans distributed blame more evenly across all five sources than did the Chinese groups, assigning more blame to lack of ability and lack of home training.

The two Chinese groups assigned more responsibility for low performance to influences over which the parents and children had control--effort and training at home. When responses about low performance on these two categories are combined, mothers from the PRC and Chinese-American communities are seen to believe that failure can be avoided by factors under the control of the family to a much greater extent than do Caucasian mothers from the U.S.

The well-documented achievement of the Chinese may occur in

part because members of this cultural group perceive failure as due to an internal, controllable source; failure can be avoided and, presumably, achievement assured by trying harder. Studies of attributional processes indicate that individuals who ascribe their failures to lack of effort tend to perform at high levels, to respond to achievement situations with high expectancies for success, and to persist in the face of difficulty (Weiner, 1980). As a group the Chinese do achieve at high levels; they may do so in part because of these beliefs and values.

Cultural differences were also obtained in explanations for relative success. In explaining why the children did as well as they did, the PRC mothers and children gave most credit to the schools. The Chinese-Americans viewed the home as most important, but also gave some credit to ability, effort, and school training. The Caucasian-Americans viewed effort and school training as most important, but also assigned some weight to ability and home training. The tendency of the PRC group to see the school as responsible may reflect their high regard for teachers and scholars. It may also indicate a culturally based reluctance to claim credit for achievement of family members; individuals are responsible for avoiding failure but share credit with external sources for success. The Chinese-Americans also referred to training, an external source, as a factor in high performance but instead of focusing on the school they gave credit to the home. It is not clear why we obtained such a marked discrepancy between the two Chinese groups on this point. It may be that the Chinese in the United States are dissatisfied with the education their children are receiving here and believe

that they must supplement the offerings of the school. Or, the Chinese-American mothers may perceive their children to study harder than their children's classmates, and believe that this is due to family discipline and encouragement.

In follow-up interviews, we asked the Chinese-American mothers to help interpret this finding. These mothers, many of whom were college graduates, reported that it is the duty of the parents to embue their children with a good attitude toward the school. Some interview responses also suggested that they lacked confidence in the school and believed that the home needs to take an active part in children's education. It seems possible, also, that mothers from the People's Republic of China had received little formal education themselves and felt less prepared to help their children in mathematics. Indeed, the school takes major responsibility for the student in the PRC. Children in the PRC spend more time in school than in the U.S.; beginning at age six, the typical child in the PRC spends from 7:30 in the morning to 3:00 at school, with one hour for lunch--six and a half hours each day. Beginning at grade four, the school day is usually an hour longer. After school, many children engage in study groups led by teachers. In addition, the school year includes about 280 days, in contrast to the more typical year of 180-200 days in the U.S. Additionally, the school is charged with responsibility for moral and physical development as well as academic performance. Until recently, children were assigned homework beginning in the first grade, and the teacher checked and graded homework every day. Parents and

teachers communicate frequently, and the schools expect teachers to visit families in their homes.

In some respects, the beliefs of the Chinese-Americans appeared to show the influences of both their Chinese cultural heritage and the dominant American culture in which they resided. In this regard, the Chinese-Americans took an intermediate position on the importance of lack of effort as the source of relative failure--they placed more emphasis on lack of effort than did the Caucasian-Americans, but less emphasis did the Chinese from the PRC. In other respects, however, the Chinese-Americans were distinguishable from both the other groups in a way that did not reflect an intermediate position. For example, the Chinese-Americans viewed the home as more responsible for the children's relative success than did either of the other two groups.

We should also note that patterns of attributions and their cultural effects depended in some cases on generation (i.e., mother, child) and child gender. When mothers and children were examined separately, the cultural differences in patterns of attributions persisted. Children in the three cultural groups distinguished themselves in ways similar to their parents. For example, there was a cultural effect on lack of effort for both mothers and children when taken separately. The interaction appears to be due in part to differences between mothers and children within cultural groups. There was a relatively large difference between Caucasian-American mothers and children in the use of bad luck as a reason for relatively low performance. Children placed greater emphasis on this causal agent than did

mothers. For the Chinese-Americans, however, there was a relatively large generational difference in lack of effort: mothers relied on this source more than did children. In addition, the child's gender influenced mothers' and children's attributions in a dissimilar manner across the three groups. Gender differences were obtained in the PRC and Caucasian-American groups, but not in the Chinese-American groups. It is difficult to account for these findings; however, they do suggest that gender differences in attributions are culturally defined.

The responses of the mothers to specific occasions when their children brought home test scores showing unusually high or low performance confirm the differences in attributional responses reported above and add some information about parental techniques for influencing children's classroom behavior. Mothers from the PRC often responded to high performance by increasing their pressure for high performance and raising their standards. Praise or acknowledgement was mixed with cautions to avoid complacency and with admonitions to strive to do even better. This technique, which seems comparable to partial reinforcement, may serve to raise the children's own internal standards. The Chinese-American mothers, like the Caucasian-American mothers, less often set higher standards and more often praised the children for success. Furthermore, the PRC mothers mentioned that they would punish the children for low marks more than did the two groups of American mothers. This tendency to treat children's low marks rather severely may be partly due to the fact that these mothers assumed that the children were fully

responsible for their low scores--they simply did not try hard enough.

One feature of the findings deserves a comment even though we offer little by way of interpretation. Attitudes toward effort when the focus in on low perforamnce show much more dramatic cultural contrasts than when the attention is on high performance. This may reflect the greater need to explain failure, noted by Dweck and Elliott (1983) but may have other sources as well in this study. Perhaps mothers from the two Chinese groups, especially the PRC, are more oriented toward avoiding failure and low performance than toward striving to be first or best. Also, modesty about one's achievement may be partly responsible for mothers not assigning chips to individual characteristics (ability and effort) of their children. It also seems possible that the emphasis in Chinese culture is on gaining competence to serve collective goals rather than doing well compared with others. A sense of collective responsibility renders low performance salient; doing well is what is expected. The spotlight is on the individual only if he/she fails to live up to group goals. Thus accomplishment is driven by a desire to achieve competence rather than by competition for the highest mark. This would give more importance to questions about low performance than to questions about achievement.

These comparisons of the beliefs of families from different cultural backgrounds indicate that motivational forces are important sources of national and cultural differences in achievement on tests of mathematical skills. They suggest, also, that motivation to achieve is fostered by family and community

networks, exerting diffuse cultural influences that support, or fail to support, the efforts of the school. The persistence of beliefs as reflected in responses of Chinese-American families about the utility of effort indicates that cultural effects are stable and are transmitted through the family. Our results, although limited in scope, suggest that cultural influences on achievement through affective and motivational sources deserve more extensive analyses. In particular, it would be worthwhile in future investigations to determine whether or not these same cultural differences in attributions and motivational strategies exist in other scholastic domains.

## Footnotes

[1] This study was conducted with funds provided by the Spencer Foundation and the National Science Foundation (Grant #NSF BNS 91-07542). Staff for the study of Caucasian-Americans included Susan Holloway, William Arsenio, and Peggy Estrada.

[2] This brief description only hints at the complexity of the place of meritocracy in ancient and modern China. For a review of recent writings on this topic, see Fairbank, J. K., (1982). "Red" or "Expert"?, The New York Review, 13-15.

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Table 1

Attributions of Mothers of Boys and Girls For Children's Relatively High Performance in Mathematics: People's Republic, Chinese-American, and Caucasian-American Groups

| | People's Republic of China Chinese (47) | | Chinese-Americans (51) | | Caucasian-Americans (47) | |
|---|---|---|---|---|---|---|
| | Girls | Boys | Girls | Boys | Girls | Boys |
| Attribution | (26) | (21) | (28) | (23) | (23) | (24) |
| Has ability | | | | | | |
| Means | 1.96 | 2.23 | 2.46 | 2.48 | 1.52 | 3.04 |
| S.D. | 1.25 | 1.76 | 1.58 | 1.41 | 1.62 | 2.01 |
| Tries hard | | | | | | |
| Means | 2.50 | 1.71 | 2.21 | 2.30 | 3.09 | 2.33 |
| S.D. | 1.27 | 1.31 | 1.40 | 1.26 | 1.04 | 1.52 |
| Good training (school) | | | | | | |
| Means | 4.19 | 4.71 | 2.32 | 2.13 | 3.26 | 2.58 |
| S.D. | 1.92 | 1.52 | 1.52 | 1.25 | 0.69 | 1.41 |
| Good training (home) | | | | | | |
| Means | 1.31 | 1.24 | 2.86 | 2.87 | 2.04 | 1.83 |
| S.D. | 1.26 | 1.18 | 1.60 | 1.46 | 1.26 | 1.34 |
| Good luck | | | | | | |
| Means | 0.04 | 0.10 | 0.14 | 0.22 | 0.09 | 0.21 |
| S.D. | 0.20 | 0.44 | 0.45 | 0.42 | 0.29 | 0.51 |

Table 2

Attributions of Mothers of Boys and Girls For Children's Relatively Low Performance in Mathematics: People's Republic, Chinese-American, and Caucasian-American Groups

| | People's Republic of China Chinese | | Chinese-Americans | | Caucasian-Americans | |
|---|---|---|---|---|---|---|
| | Girls | Boys | Girls | Boys | Girls | Boys |
| Attribution | (26) | (21) | (28) | (23) | (23) | (24) |
| Lack ability | | | | | | |
| Means | 1.54 | 1.14 | 2.43 | 1.61 | 3.34 | 1.92 |
| S.D. | 1.82 | 1.77 | 2.00 | 2.25 | 2.55 | 2.62 |
| Lack of effort | | | | | | |
| Means | 6.27 | 6.57 | 3.89 | 4.91 | 2.17 | 3.96 |
| S.D. | 2.88 | 3.08 | 3.08 | 3.59 | 1.53 | 3.04 |
| Poor training (school) | | | | | | |
| Means | 1.08 | 0.90 | 1.43 | 1.22 | 2.00 | 2.50 |
| S.D. | 1.81 | 1.41 | 1.75 | 1.70 | 2.00 | 2.47 |
| Poor training (home) | | | | | | |
| Means | 1.08 | 1.33 | 2.04 | 1.96 | 1.96 | 1.38 |
| S.D. | 1.38 | 1.53 | 1.86 | 2.42 | 1.43 | 1.58 |
| Bad luck | | | | | | |
| Means | 0.04 | 0.05 | 0.21 | 0.30 | 0.52 | 0.25 |
| S.D. | 0.20 | 0.22 | 0.79 | 0.76 | 1.20 | 0.90 |

Table 3

Attributions of Boys and Girls For Children's Relatively High Performance in Mathematics: People's Republic, Chinese-American, and Caucasian-American Groups

| | People's Republic of China Chinese | | Chinese-Americans | | Caucasian-Americans | |
|---|---|---|---|---|---|---|
| | Girls | Boys | Girls | Boys | Girls | Boys |
| Attribution | (26) | (21) | (28) | (23) | (23) | (24) |
| Has ability | | | | | | |
| Means | 1.96 | 2.10 | 1.75 | 1.87 | 1.09 | 1.92 |
| S.D. | 1.25 | 1.84 | 1.76 | 1.29 | 1.34 | 2.22 |
| Tries hard | | | | | | |
| Means | 3.04 | 1.90 | 2.93 | 2.74 | 2.70 | 3.00 |
| S.D. | 1.34 | 1.22 | 1.41 | 1.28 | 1.30 | 1.32 |
| Good training (school) | | | | | | |
| Means | 3.04 | 3.81 | 2.25 | 2.04 | 3.00 | 2.42 |
| S.D. | 1.46 | 1.54 | 1.58 | 1.22 | 1.35 | 1.14 |
| Good training (home) | | | | | | |
| Means | 1.73 | 2.05 | 2.57 | 2.91 | 2.22 | 2.42 |
| S.D. | 1.31 | 2.06 | 1.60 | 1.12 | 0.95 | 1.28 |
| Good luck | | | | | | |
| Means | 0.23 | 0.14 | 0.50 | 0.44 | 1.00 | 0.25 |
| S.D. | 0.43 | 0.66 | 0.74 | 0.51 | 1.09 | 0.68 |

Table 4

Attributions of Boys and Girls For Children's Relatively Low Performance in Mathematics: People's Republic, Chinese-American, and Caucasian-American Groups

| | People's Republic of China Chinese | | Chinese-Americans | | Caucasian-Americans | |
|---|---|---|---|---|---|---|
| | Girls (26) | Boys (21) | Girls (28) | Boys (23) | Girls (23) | Boys (24) |
| Lacks ability | | | | | | |
| Means | 2.08 | 1.19 | 2.32 | 2.48 | 3.52 | 3.25 |
| S.D. | 2.50 | 1.33 | 2.37 | 2.23 | 2.19 | 2.80 |
| Lack of effort | | | | | | |
| Means | 5.38 | 6.81 | 3.14 | 3.78 | 1.83 | 2.12 |
| S.D. | 3.07 | 2.68 | 2.93 | 2.97 | 1.88 | 2.52 |
| Poor training (school) | | | | | | |
| Means | 1.12 | 0.19 | 1.21 | 1.26 | 1.39 | 1.21 |
| S.D. | 1.34 | 0.51 | 1.52 | 1.45 | 2.35 | 1.53 |
| Poor training (home) | | | | | | |
| Means | 1.35 | 1.62 | 1.50 | 1.35 | 1.44 | 1.38 |
| S.D. | 1.72 | 2.46 | 2.47 | 1.77 | 1.70 | 1.91 |
| Bad luck | | | | | | |
| Means | 0.08 | 0.19 | 1.82 | 1.13 | 1.83 | 2.04 |
| S.D. | 0.27 | 0.87 | 1.98 | 1.29 | 2.19 | 2.26 |

Table 5

Frequencies and Percentages of Strategies Used by Mothers in Response to Specific Instances of Children's Relatively High and Relatively Low Performance

| Type of Response | People's Republic of China Chinese | | Chinese-Americans | | Caucasian-Americans | |
|---|---|---|---|---|---|---|
| | N | % | N | % | N | % |
| Relatively high performance | | | | | | |
| Provides rewards, without setting higher standards | 9 | 19 | 30 | 73 | 15 | 83 |
| Sets higher standards, with or without praise | 31 | 66 | 10 | 24 | 1 | 06 |
| Other | 7 | 15 | 1 | 02 | 2 | 11 |
| | 47 | | 41 | | 18 | |
| Relatively low performance | | | | | | |
| Punishes or threatens punishment | 10 | 21 | 1 | 02 | 0 | -- |
| Determines reason | 15 | 32 | 25 | 61 | 12 | 67 |
| Mentions need for more care or effort | 13 | 28 | 12 | 29 | 4 | 22 |
| Other | 9 | 19 | 3 | 07 | 2 | 11 |
| | 47 | | 41 | | 18 | |

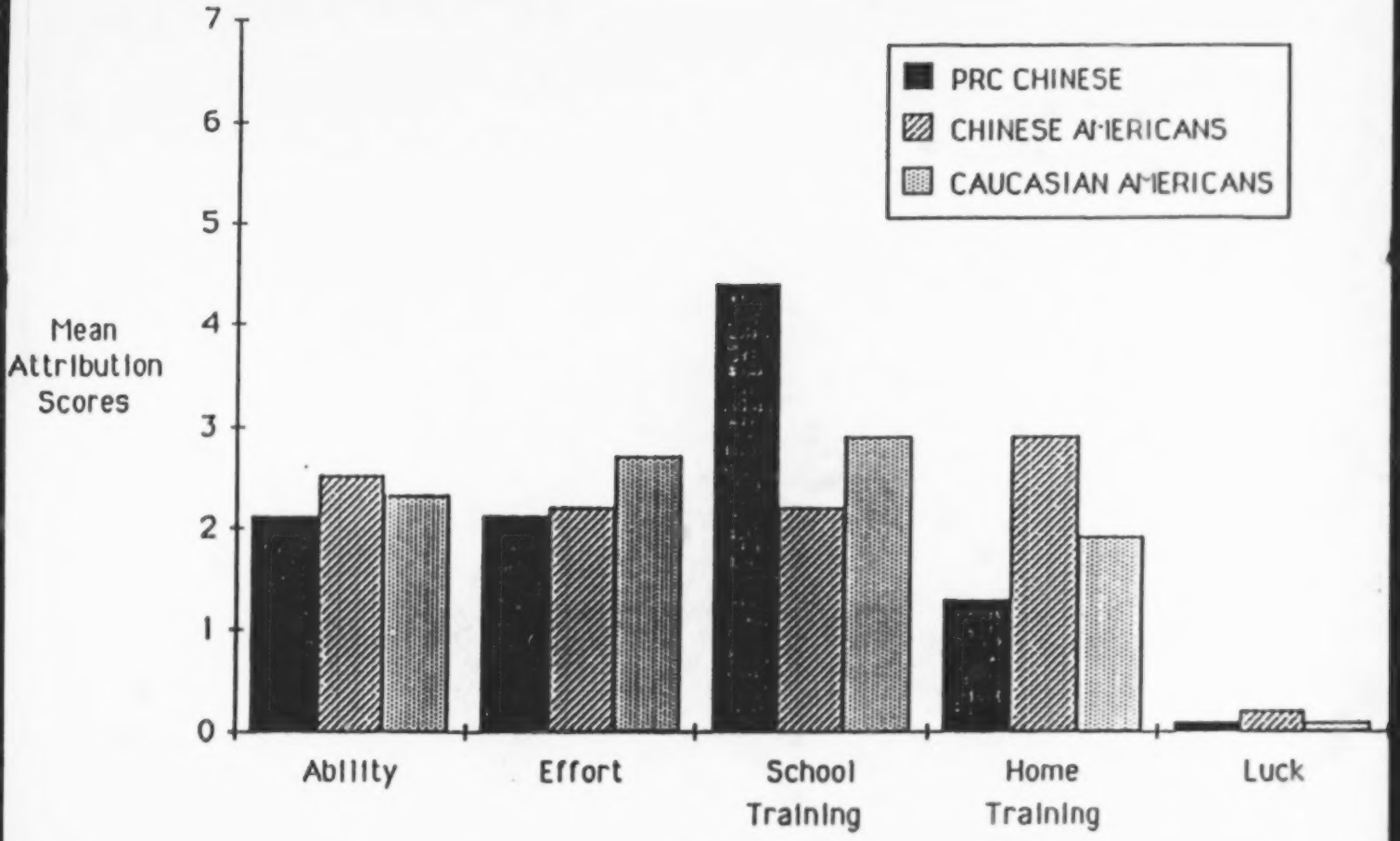


Figure 1. Mothers' Attributions for Relative Success

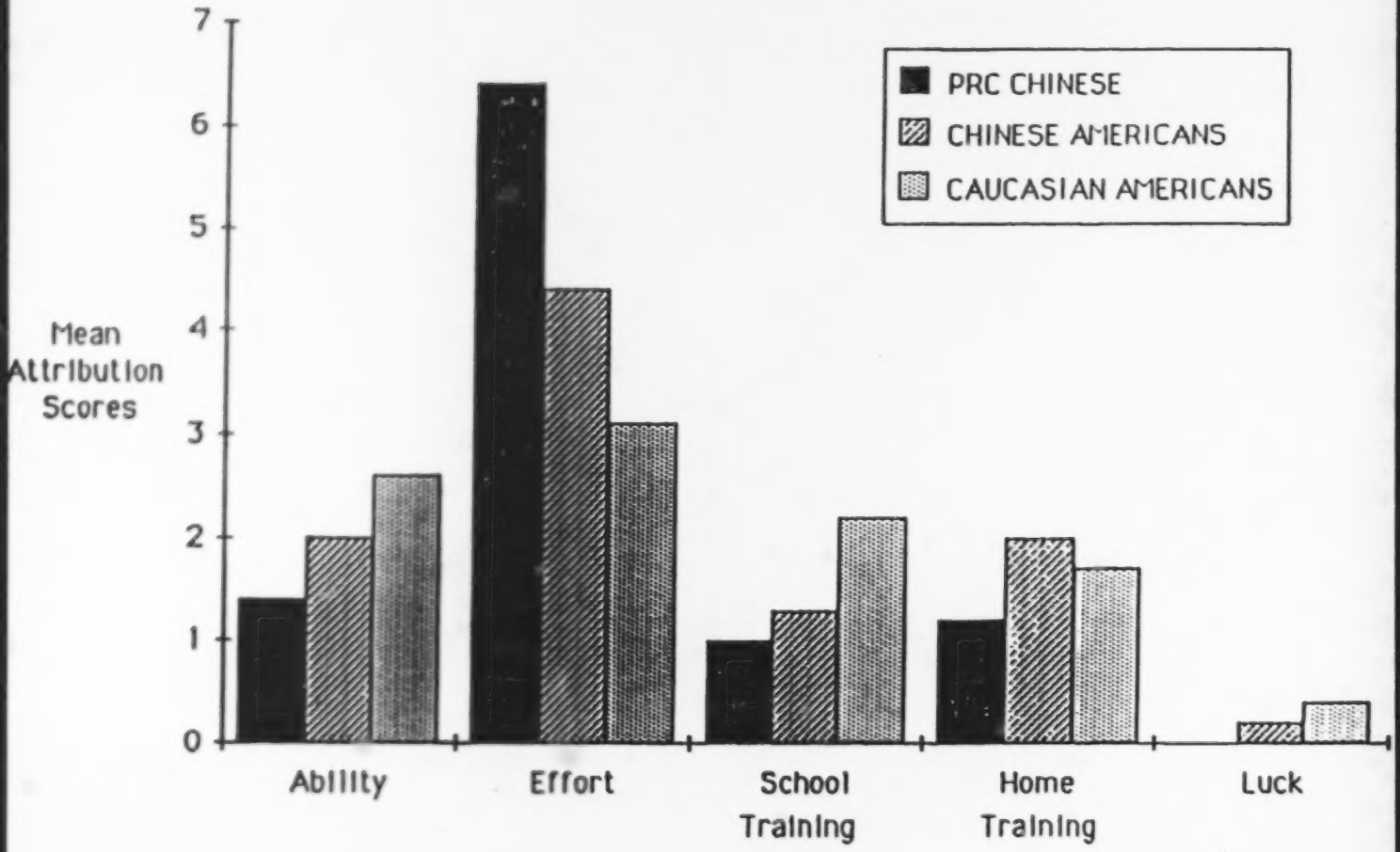


Figure 2. Mothers' Attributions for Relative Failure

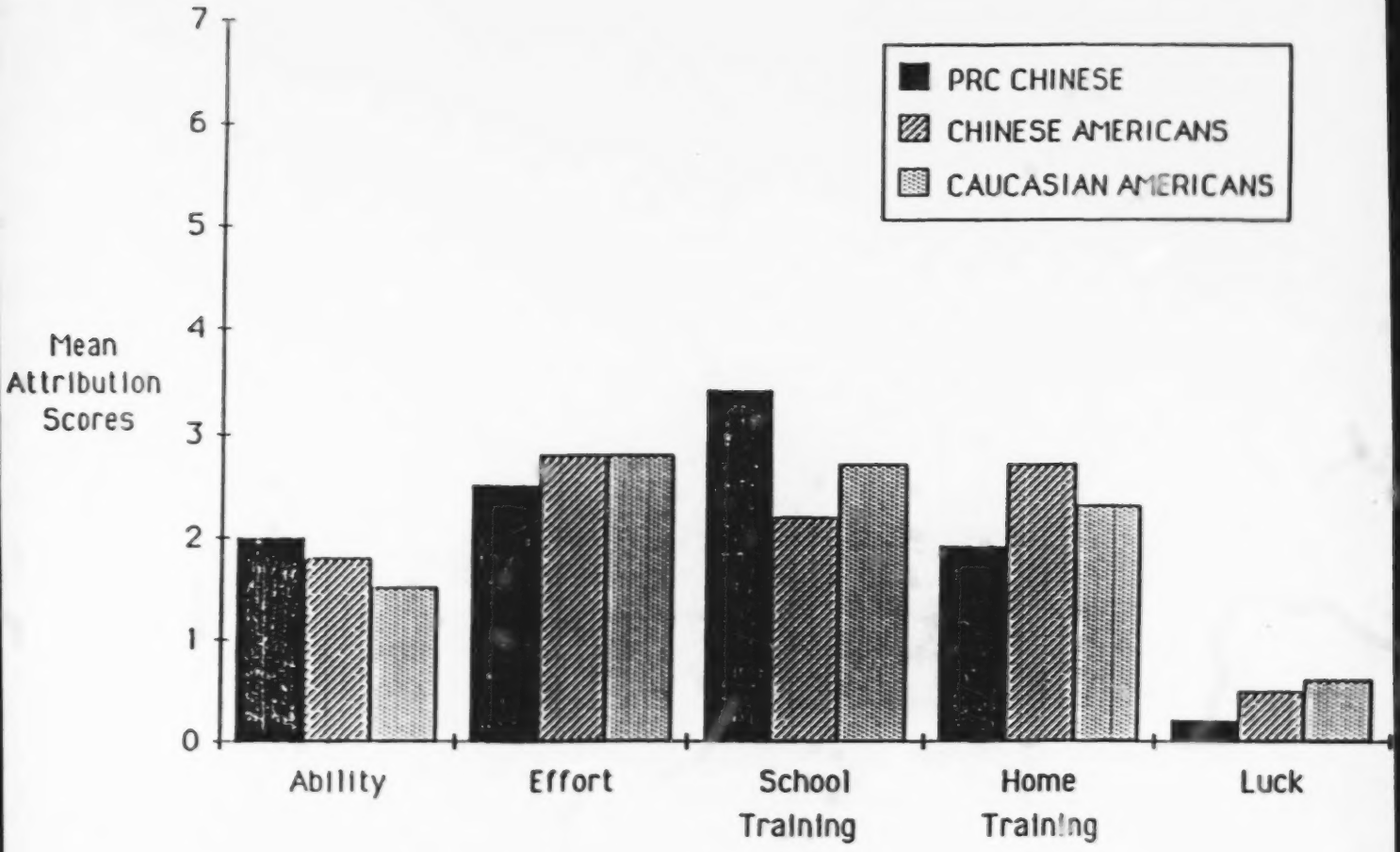


Figure 3. Children's Attributions for Relative Success

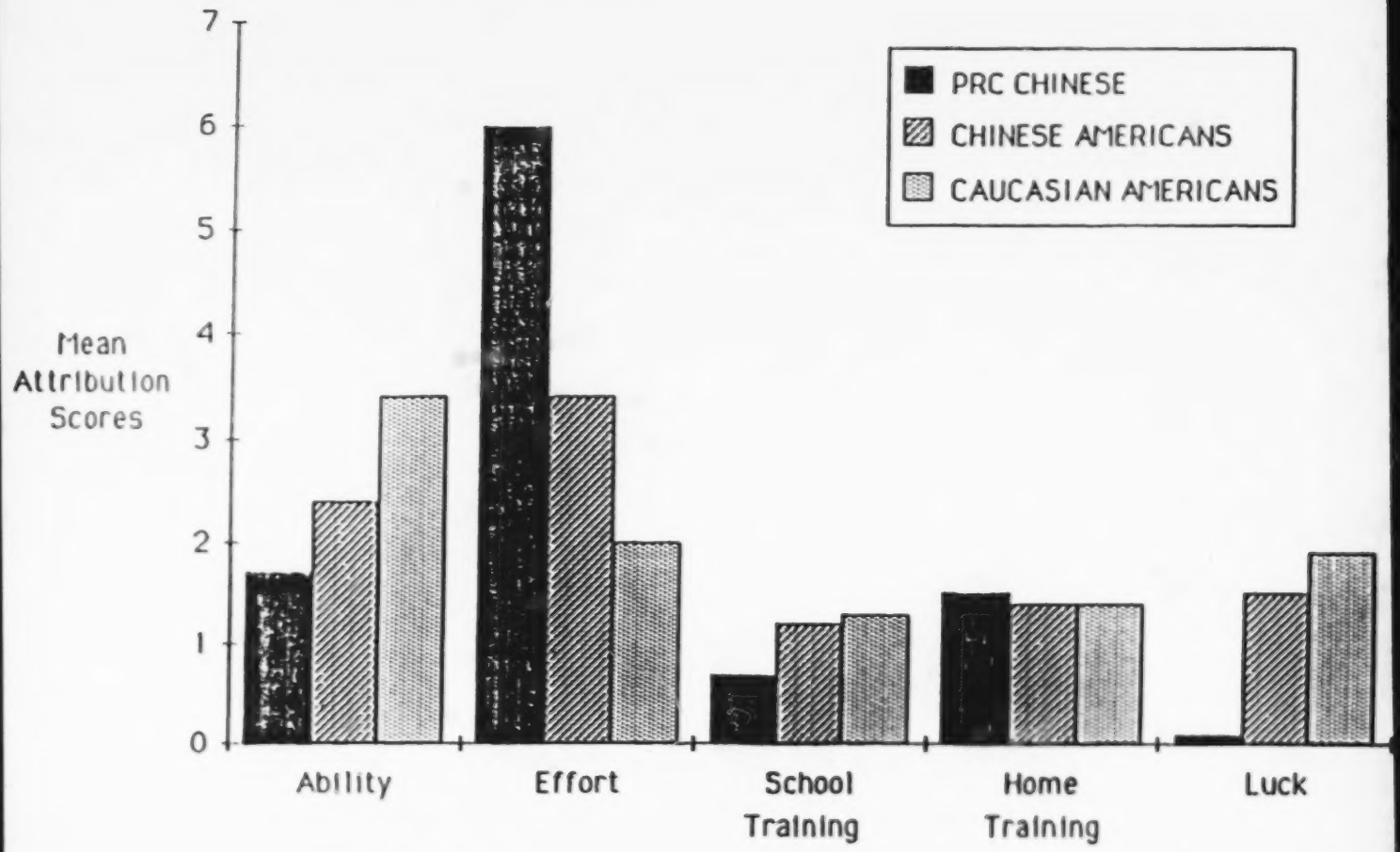


Figure 4. Children's Attributions for Relative Failure